Digital Public Library of America Service Hub Website Analysis

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Introduction

In 2019-01, the Illinois Digital Heritage Hub (IDHH) began the outreach and marketing campaign of its lifecycle. A part of this phase is the development of a website for users mainly across the state of Illinois. The first phase of the web development project involved analysis of existing service hub websites in order to develop an understanding of possible audiences, content and features, and design and presentation among these sites. In order to analyze websites, an evaluation rubric and database were created for collecting data. Analysis of the data provided insight into user bases, content, and presentation choices common across service hub sites, preparing the ground for design recommendations, maintenance strategies, and web development platform options for the IDHH website.

Data Collection Method

From 2019-01-28 through 2019-02-11, the IDHH conducted analyses of 25 DPLA service hub websites, representing the majority of the 40 hubs contributing to the Digital Public Library of America (DPLA) and all of the service hubs as of 2019-02-12. Based primarily on a preliminary survey of three hub sites with web presences that were particularly robust (Digital Library of Georgia, PA Digital, and the Portal to Texas History), a database of evaluation points for these and other sites was created in Airtable[1] along with a front-end rubric[2] so that each site would be evaluated consistently.

In order to manageably collect and analyze the data, it was grouped into four main categories:

1) Data about the hub, such as its founding date, geographic area covered
2) Perceived site audience, determined by implicit cues or explicit references on the site such as navigation menu options for certain user groups
3) Features and content, such as search and discovery options, curated exhibits, primary source sets
4) Content presentation, such as navigation structure, page layout, and aesthetic choices related to branding

Hubs: Many Shapes and Sizes

Most of the data categories pertain to hub websites although several fields help describe the hub, such as the date the hub formed, whether or not it predated the DPLA, the number of records it contributes to the DPLA, as well as the number of contributors it supports. These data are important for keeping the IDHH web design project in perspective and managing expectations as the hubs with the most robust web presences are typically older and have more

[1] https://airtable.com/shrl46CNHgPC945VY
[2] https://airtable.com/shrGd7wv4p8SYvX6q

providers and contribute more content in comparison to the IDHH and many other younger hubs established since 2016.

Hub	Number of Records
National Archives and Records Administration	12,974,419
Smithsonian Institute	3,280,901
HathiTrust	2,836,982
New York Public Library	2,048,825
Portal to Texas History	1,238,580

Table 1: Hubs that provide the most records. These hubs are not easily compared to the IDHH. The first four are not service hubs like the IDHH but content hubs (discussed below). Three of them are national organizations. Most have existed for decades and either exist in a much larger network of content providers or vast collections beyond the scope of the IDHH.

Hub	Number of Records
Illinois Digital Heritage Hub	310,165
Michigan Service Hub	270,215
Biodiversity Heritage Library	224,417
Sunshine State Digital Network	204,864
South Carolina Digital Library	200,615

Table 2: 5 Hubs that contribute median numbers of records. With the exception of the national organization and content hub, Biodiversity Heritage Library, these hubs' size, age, and web presences are more comparable to the IDHH than most other DPLA partners.

Hub	Region	Founding Date	Date hub began providing content	Contributors	Records in DPLA
Illinois Digital Heritage Hub	Illinois	2016	2017-01	147	310,165
Ohio Digital Network	Ohio	2016	2018-02-19	15	100,757
Michigan Service Hub	Michigan	2016-02-12	2017-02-03	>50	270,215
Big Sky Country Digital Network	Montana	2016-07-07	2017-08	69	71,086

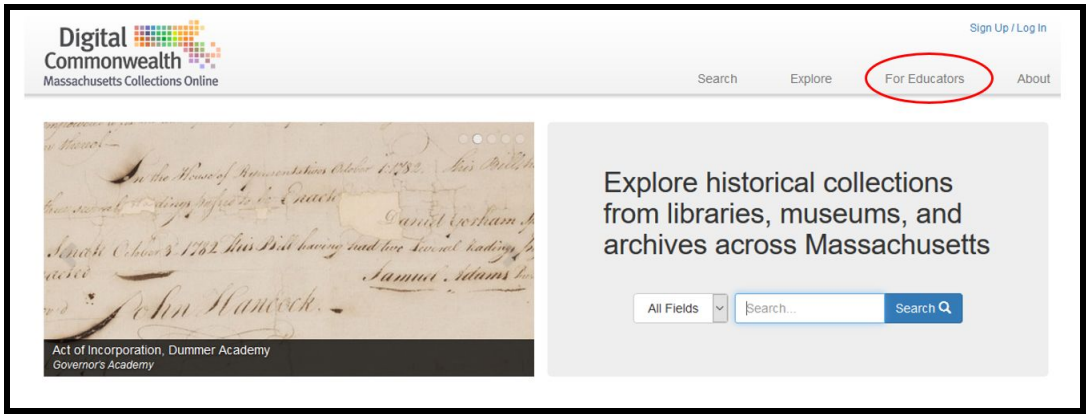
Table 3: Hubs founded the same year as the IDHH. With the exception of the IDHH, these hubs have websites, although features and capabilities vary. For example, only the Big Sky Country Digital Network site provides search and discovery.

Due to the large number of hubs and the fact that many had web presences that were not suitable and/ or comparable to the IDHH, decisions needed to be made on how to collect data from the most relevant sources and in a manner conscious of time and other resources. Thus, it was decided to exclude data from content hubs. Whereas services hubs like the IDHH are state-wide or multi-state collaborative aggregation initiatives that also typically provide outreach, training, and promotion initiatives for their members, content hubs are discrete institutions that do not necessarily need to aggregate their metadata in order to provide it to the DPLA from a single feed.[3] Content hubs' funding models, geographic coverage, often enormous content contribution, and therefore, their website's user bases and design choices are fundamentally different from service hubs. Content hubs' web presences are often highly integrated within their host institutions' websites and are therefore difficult to analyze separately.

Site Audience Analysis

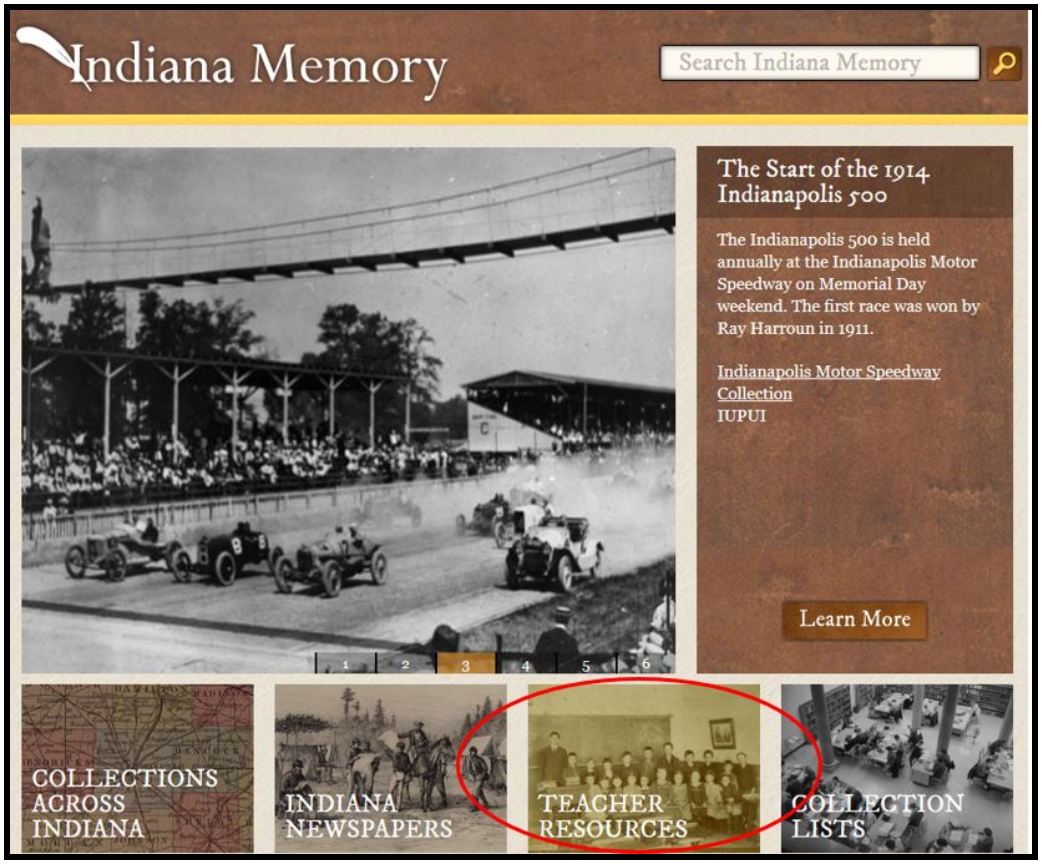
Sites were analyzed in order to determine their audiences. Audience was determined in one of three ways:

1) Directly through site's mention of target audiences, for example, on a usage guide page or in site navigation options addressing particular users ("For Educators")

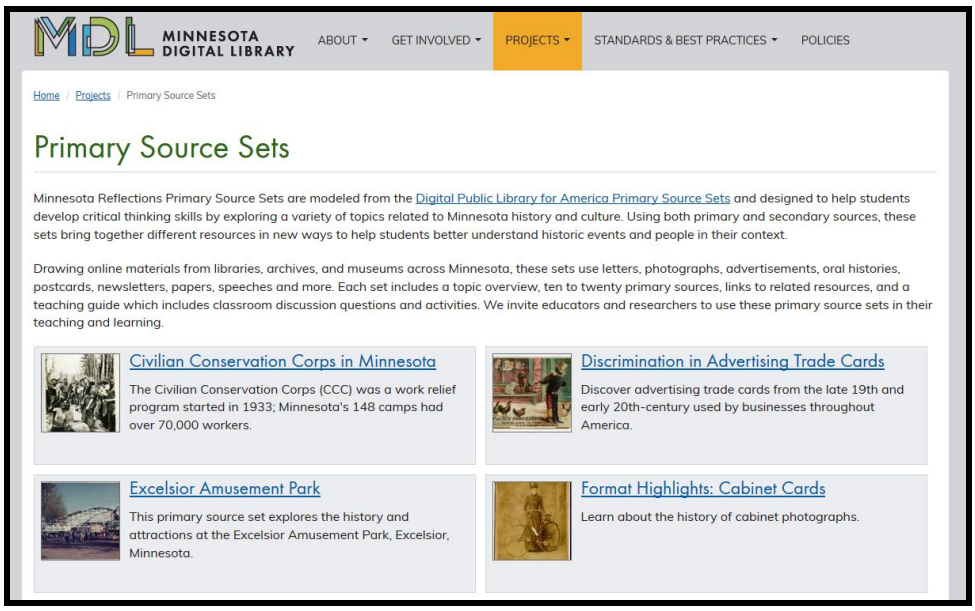


[3] https://pro.dp.la/prospective-hubs

2) Directly through content that was labeled appropriate to specific audiences, such as K-12 students, educators, scholars, etc.



3) Implicitly through content that was not explicitly labeled for an appropriate audience it was inferred to be useful to them. An example is primary source sets with themes and topics appropriate for K-12 educators and learners



In all, 14 distinct target audiences were identified across 25 service hub sites. Of these, the most common audience by far was contributing institutions and staff. More than three-quarters (21) of hubs surveyed provided material for contributors, such as project documentation, digitization resources, metadata best practices, etc. In fact, 11 sites, or more than one-third surveyed, were dedicated only to contributors.

A hub site's audience seems to correlate with the age of the organization. Newer hubs are usually establishing themselves as service hubs and in the process of enlisting partners, contributors, and building a viable pool of content. Older hubs that have already established a base of contributors and are now focusing on outreach and promotion, or, especially organizations that were already robust statewide or interstate networks of contributors before their involvement with the DPLA tend to have much broader website audiences. These include the next most common audience, K-12 educators. Hubs are far more likely to serve K-12 educators rather than K-12 students directly, who are a distant third and, while several sites refer to their content being for K-12 students, no service hub site presents content in a manner geared for K-12 students. Hobbyists, such as users interested in family genealogy or local history rank as the fourth most common target audience. On average, hubs generally served three audiences each.

Site Audience	**Number of Hubs**
Contributing Institutions and staff	21
Educators k-12	10
Students k-12	5
Hobbyists	6
Scholars beyond undergrad	4
Local historians	4
Developers	3
Undergraduate College Students	2
Business professionals	2
Instructors in Higher Ed	1
Social work professionals	1
Healthcare professionals	1

Table 4: All service hub site audiences along with the number of sites that appeal to these audiences. For information on how site audiences were determined, see the Site Audience Analysis introduction above.

College and university instructors and students are rarely engaged by hub websites, which is in keeping with the DPLA's recommendations for use.[4] The DPLA has allocated resources for developing materials for and reaching out to K-12 teachers but has not dedicated much attention to undergraduate college education potential. Other potential DPLA users are sometimes engaged, such as graduate and postgraduate researchers and developers. Three service hubs, Digital Commonwealth, the Digital Library of Georgia, and the Portal to Texas History cater to developers by providing APIs that can be used to develop web applications for partner institutions or for other purposes.

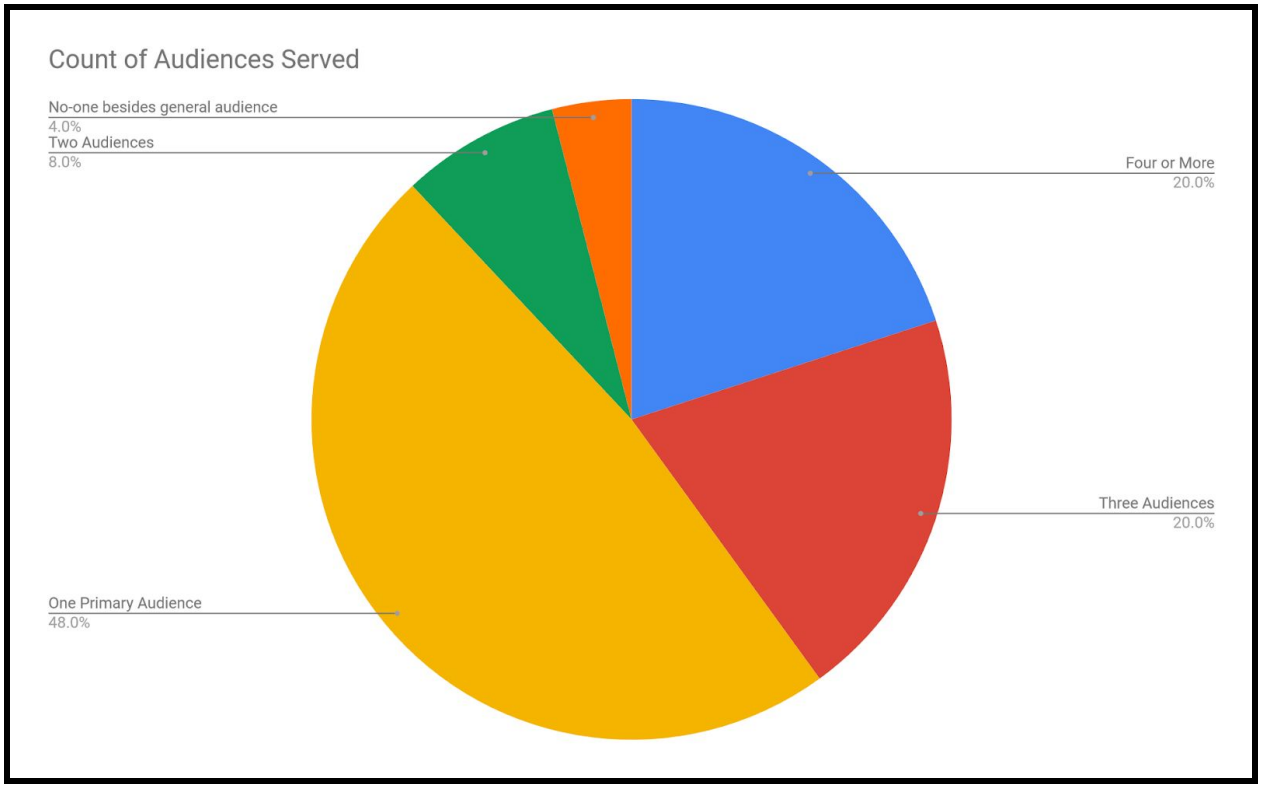


Figure 1: Breakdown of the number of audiences hub sites tend to serve

Site Contents and Features

29 categories of service hub website content were identified, with 13 types each appearing across 10 or more service hub websites each. About pages and orientation materials for providers were the most common site features; unsurprising as contributors were the most common target audience among hub sites and exclusive audiences for more than one-third of the sites surveyed. The next most common features are lists and/ or maps of contributor institutions, provided by three-quarters of sites surveyed. Just over half of service hub sites offer search and discovery.

[4] https://dp.la/guides

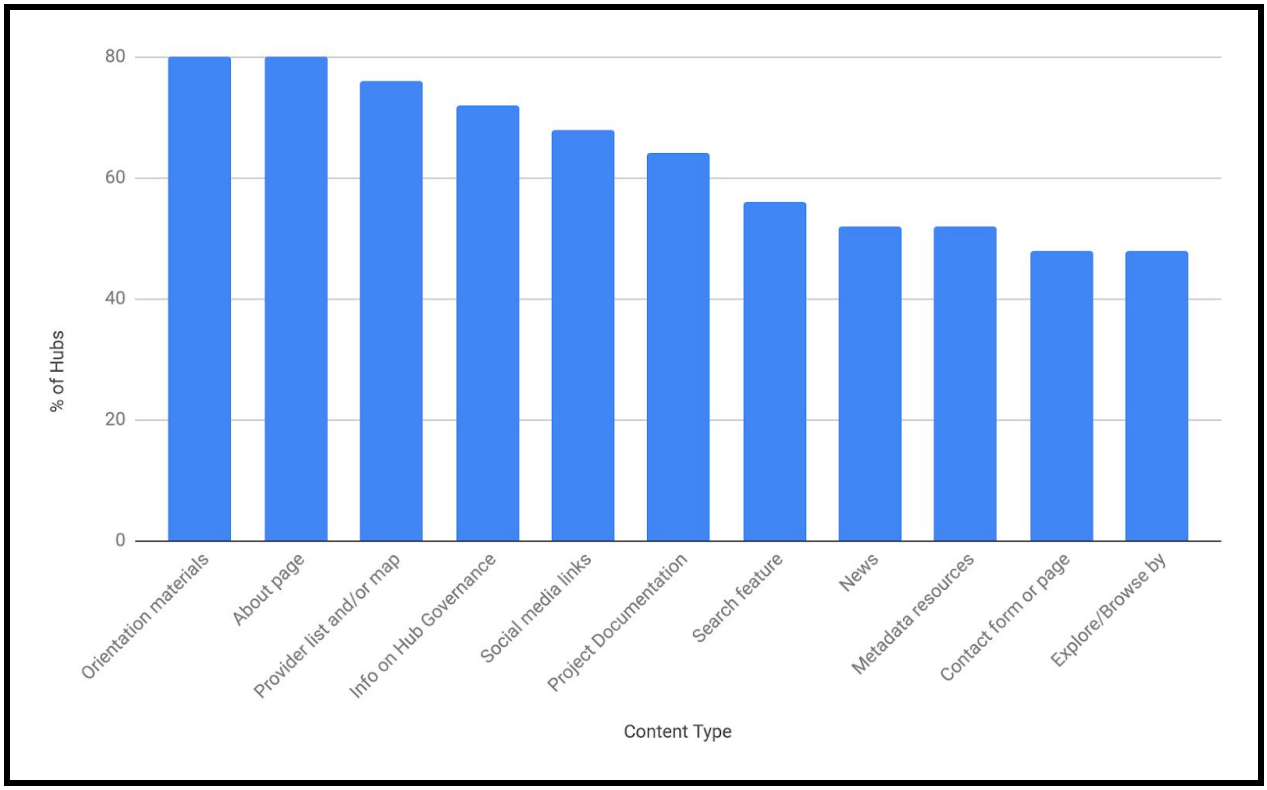


Figure 2: Most common content choices and corresponding percentages of sites with features. For all a list of all content types, see Appendix I.

Some features warrant further discussion, including provider lists, materials for contributors, search and discovery options, and 'explore by' or 'browse by' choices. Other common features were left out of detailed analysis. About pages tend to be unique to each hub and therefore, are difficult to generalize about. News pages and contact pages are familiar web design features for most sites and are very similar across hub sites and therefore, do not warrant elaborate analysis. Social media links will not be especially relevant in early phases of the IDHH web development project as the hub does not have a social media presence beyond a blog.

Materials for Contributors

80% of service hub sites include some form of on-boarding orientation material for contributors, beyond just descriptions or overviews of the project. Material for contributors may include an archive of documentation, such as digitization resources, harvest workflows, metadata standards and best practices documents, information on copyright. The type of documentation varies depending on the type of support the service hub is able to provide. The most common documents by far are on metadata. Many sites include other resources, such as for digitization, and guidance on intellectual property rights for digital objects and digitization. Not every site included all forms of documentation identified, revealing some possible priorities for content development for the IDHH website's documentation archive.

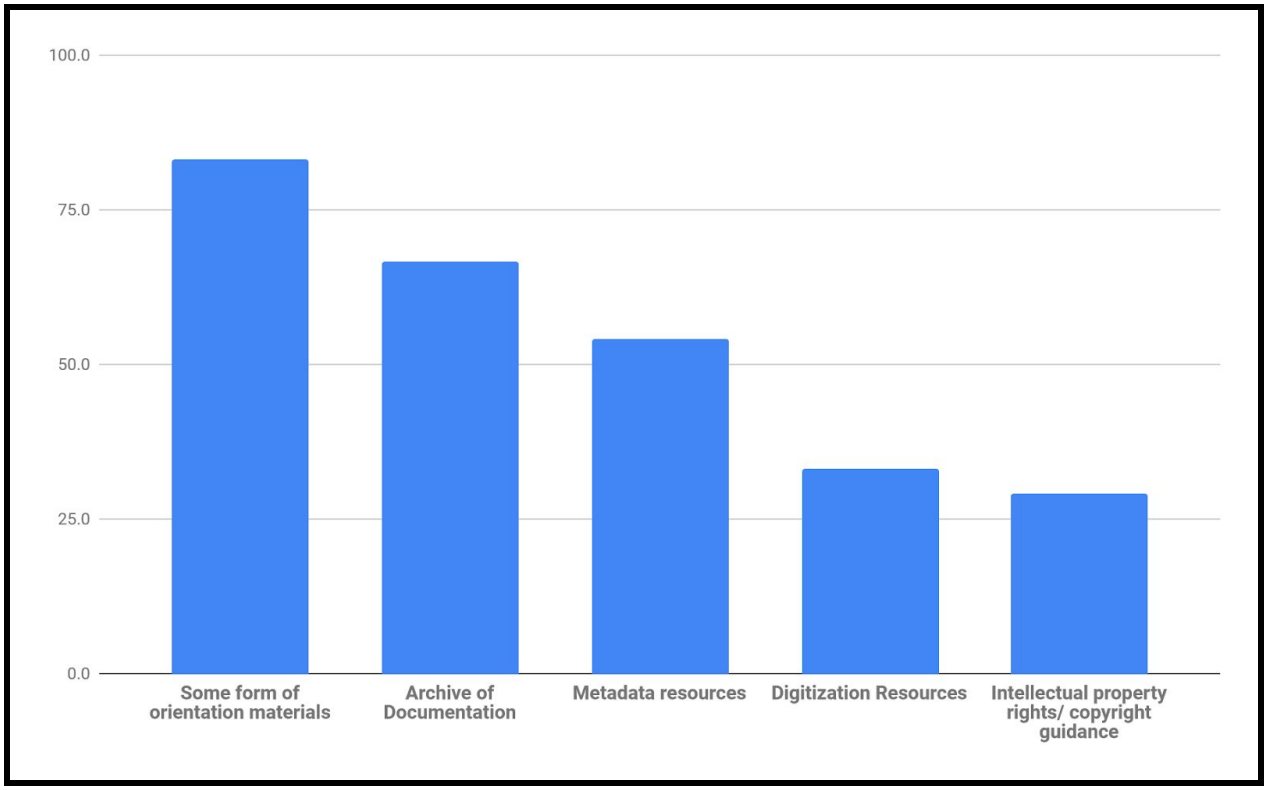


Figure 3: Types of resources for contributors and corresponding frequency of occurrence on service hub sites. An archive of documentation refers to a collection of resources covering one or more of the three categories of materials for contributors: metadata, digitization, or intellectual property

Provider Lists

Lists of contributor institutions appear in 76% of service hub sites. There are four main approaches to presenting these lists:

1. As a simple HTML unordered list (District Digital)
2. as a list with links to the provider institution's websites or repositories (Digital Virginias, Missouri Hub, Sunshine State Digital Network)
3. a list of links to the provider's record set in the DPLA (Ohio Digital Network, PA Digital, Plains to Peaks Collective)
4. a list of links to the provider's record set in a local catalog (Calisphere, Digital Library of Georgia, Digital Commonwealth, Digital Maine, Indiana Memory, Kentucky Digital Library, Mountain West Digital Library, North Carolina Digital Heritage Center, Portal to Texas History, Recollection Wisconsin, South Carolina Digital Library)

As they appear so frequently across hub sites, provider lists are a nearly essential feature. On the one hand, they serve to provide credit to individual provider institutions whose contributions are invaluable and form the backbone of the hub. Moreover, for those provider lists that serve

as links, these allow users to view individual items and collections at particular institutions; for example:

1. casual users curious to see what their local public library has contributed
2. professional users, such as staff at contributor institutions who wish to easily view what they've already contributed to the DPLA and who might then promote their collection through the links on the provider list.

Additionally, PA Digital includes an image from each provider's collection for each provider link. Ohio Digital includes record counts along with their list of provider links that appear to be updated manually on each update. This may be feasible for the IDHH if it is possible to include for each provider containing the number of records that updates automatically on each ingestion.

A handful of providers, Digital Library of Georgia, Ohio Digital, PA Digital, Plains to Peaks Collective, and Sunshine State Digital Network feature Google maps of the hub geographic region with markers for all providers. One hub, Minnesota Digital Library, includes only the map with no list of providers. Maps often include links to provider institutions or to item sets in a local catalog. Heads of development for the Digital Library of Georgia learned that their map feature was underutilized compared to other ways of browsing the collection; this view as well as the fact that only 21% of hubs feature a map, indicates that this feature is not a common design choice and should be a low priority item on the IDHH development options.

Search and Discovery

Only 14 of the 25 service hubs had search features on their sites. In most cases, search and discovery is powered by a single catalog of a service hub's records, which often includes records in addition to just those provided to the DPLA. The search box of one hub, the Big Sky Digital Network of Montana, links out to conduct a keyword search of the DPLA site's catalog based on user input. The search does not link only to Big Sky Country's records in the DPLA but to all providers' contributions. Recollection Wisconsin has two sites with different search interfaces; one is an OPAC-like interface powered by a key partner, University of Madison Wisconsin[5] and another, which is planned to supercede this latter catalog, is powered by DPLA Local.

As with the number of different audiences to which a service hub site appeals, there is a correlation with the age of the hub and whether the service hub site has a search as well as the search feature's robustness. Only two hubs formed since 2013 (the year of the founding of the DPLA) have search and discovery interfaces whereas older, more established hubs 1) have search features and 2) the technology and appearance of these features vary significantly across hubs, ranging from OPAC-like systems that link out to partner CMSes, to the highly

[5] As of 2019-05, the OPAC-like search interface has been deprecated. Searches on recollectionwisconsin.org now link out to the DPLA Local search interface on recollectionwisconsin.dp.la.

centralized architecture and design choices by the Portal to Texas History.[6] Texas History was founded in 2005 and another hub with particularly modern design and usability is the Digital Library of Georgia, founded in 2002.

Investigation of catalogs revealed that hubs frequently do not provide all of their records to the DPLA. One example is Indiana Memory, where only just over 320,000 of its 560,000 local records appear in the DPLA catalog as of 2019-01-28. This suggests that some hubs are more focused on housing statewide or other regionally specific collections primarily while providing metadata to the DPLA as a secondary purpose.

Search boxes usually appeared prominently near the top of the home page and less visibly but still high up on other site pages. The most common placement of the search bar was at the top right of all pages. Another common location was top center, whereas only three sites' search bars were located in the top left. The Minnesota Digital Library was the one that, though having a search feature, the search box was nowhere to be seen until the user navigates to the correct page within the site structure.

Search Box Location	**Count**
Top center	6
Top right	5
Top left	2
Not in site template	1
No search feature	11

Explore by Options

Besides search features, 12 sites offer ways to select items based on certain facets, usually described as "explore by…" or "browse by" categories. By far, the most common were explore by contributor and collection. Other options included Type and/ or Format, locations, such as counties or cities, rights information such as "free to use" resources, topic or subject categories, creation dates or other temporal metadata, and different disciplines of which items or collections may be a part. Some sample categories curated by subject include Recollection Wisconsin's DPLA Local site options, including, "Dairy Industry", "Breweries", and "Logging". The South Carolina Digital Library provides another example of topics curated that are specific to a particular state or region, with subjects including "Civil War in America", "Plantation Life", and "Reconstruction Era". The content hub, Washington University includes subjects specific to the region, including "Pacific Northwest" and "Mountaineering".

[6] https://texashistory.unt.edu/about/portal/technology/

Presentation and Site Structure

Navigation

Most sites feature a single horizontal navigation bar that appears consistently in the same location throughout the site's structure. The location of the navigation is always near the top of the page. However, there's not significant agreement on the exact location, with sites split evenly in terms of whether the bar is centered, or left- or right-justified. Note that the count of sites in the table below is greater than the 25 service hub sites surveyed as several sites had multiple navigation options on every page.

Navigation Orientation and Location	**Count**
Horizontal, top right	9
Horizontal, top left	8
Horizontal, top center	7
Vertical, left	2
Vertical, right	1

Any given hub site would have on average, three to six top level navigation options with many different ways of describing similar choices between sites.

Image 4: Recollection Wisconsin's site features a typical navigation menu in terms of the number of main top level categories (Explore, Exhibits, Guidelines, and Get Involved) as well as several dropdown menu options for three of the top level categories.

In all, there were 62 different labels for top level navigation options across the 25 sites surveyed, not including the sub-categories that may appear in, for example, drop-down menus from a top level option. The overwhelming number of different labels for pages with similar content across sites necessitated a way of sorting labels into more inclusive categories. These 62 categories were coded and assigned to a "generalized navigation category", for which particular top-level categories are synonyms. For example, there were several synonymous labels for pages that each serve a similar function, providing a general introduction to the project for prospective contributors, such as "Getting Involved", "How to Join", "How to Participate", "Ready to Participate?", "Participate", etc. These were filed under the general category of "For Contributors". "For Contributors" was chosen as the general category as it was used more often than any other similar title. This method in addition to identifying which top level navigation options on some pages appear as subpages on other sites resulted in a much more manageable list of 17 top-level categories.

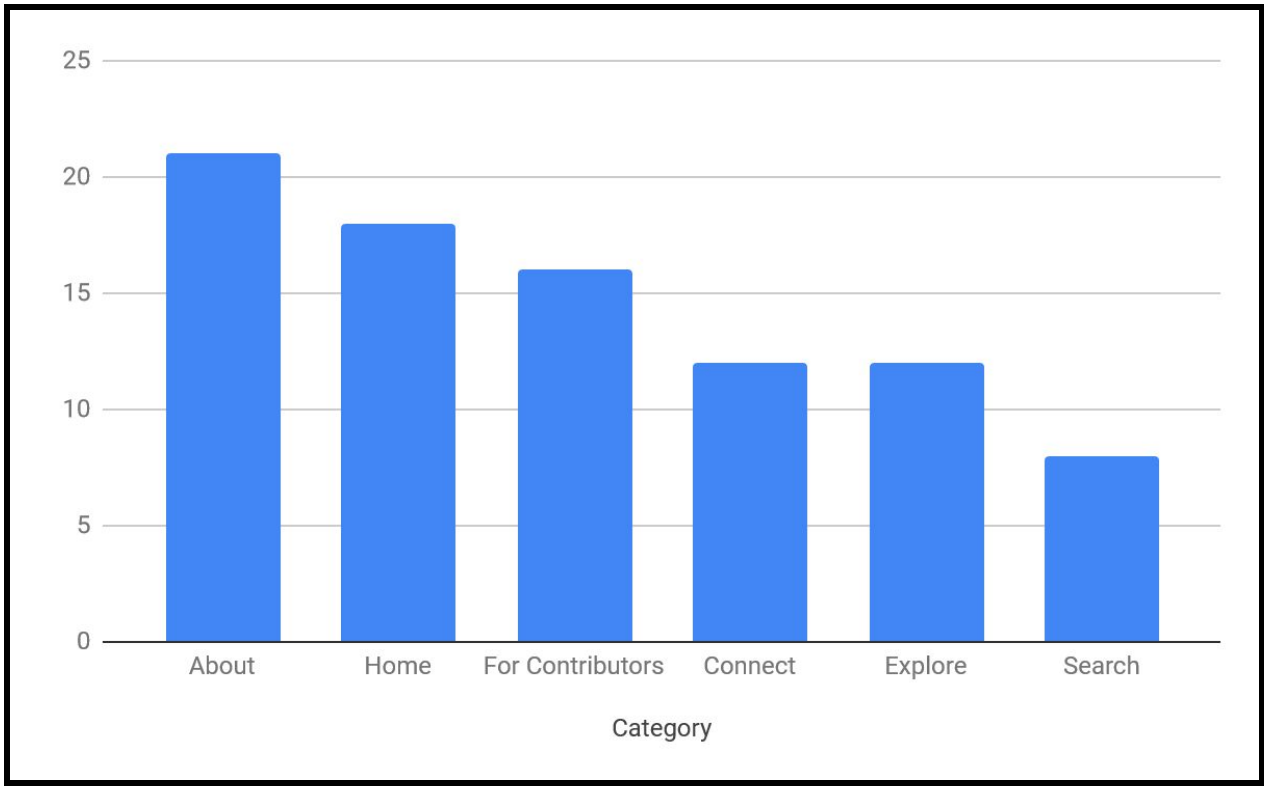


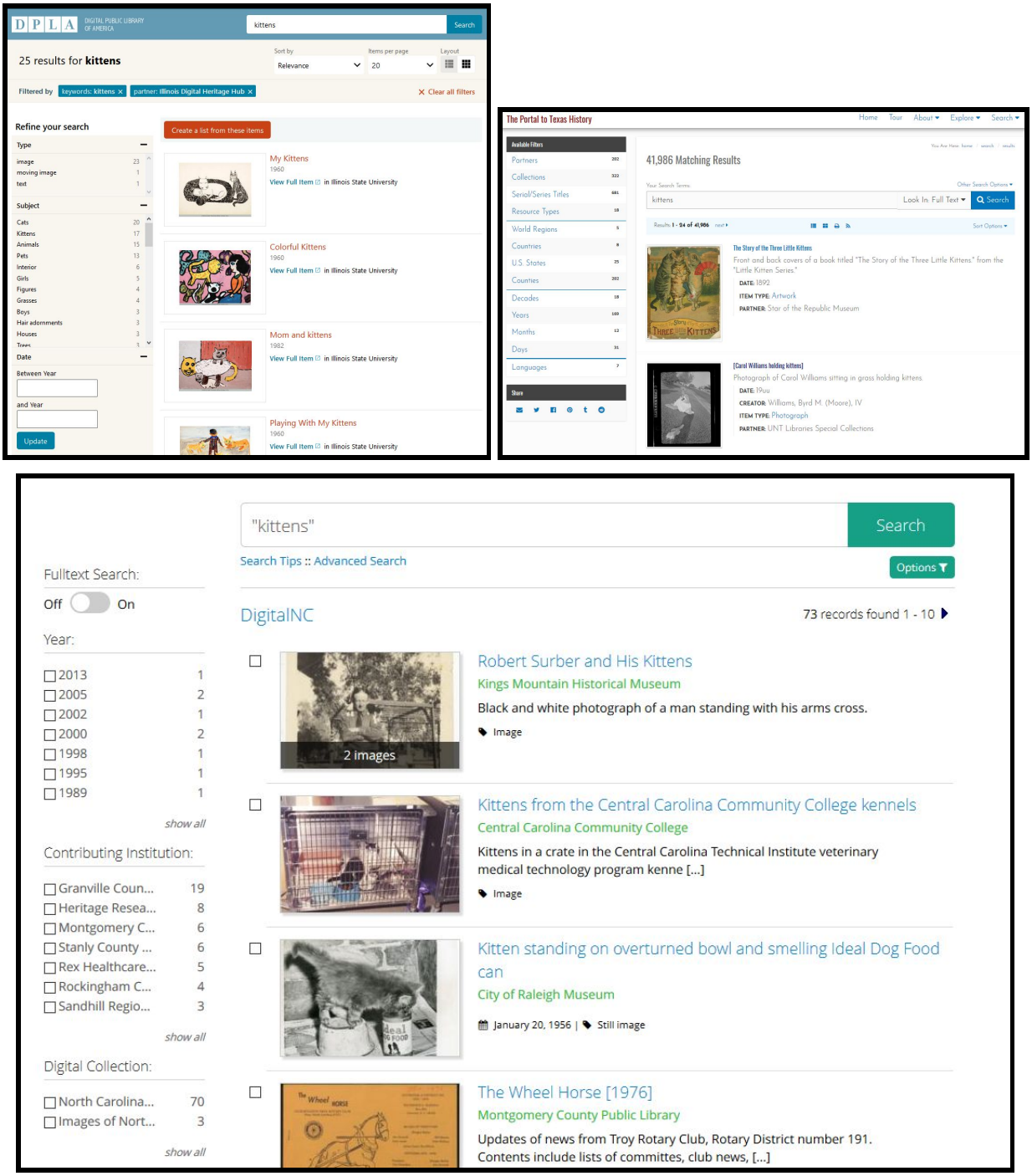
Figure 4: The five most common main navigation categories and number of hubs with these options. For a complete list of navigation categories, see Appendix II.

Hub sites took several distinct approaches to the wording of their navigation choices. Some chose to group content under a general category, such as "About" or "Resources", as in

resources for (potential) contributors. Other sites appealed to their presumed audience, such as “For Contributors” or “For Educators”. There were additional approaches to engaging users. For instance, instead of using prepositional phrases such as “For Contributors”, “For Educators”, etc., some sites use active verbs and imperative tenses like “Get Involved”, “Participate”, “Explore and Teach”, or “Stay in Touch”. Other sites use gerunds like “Getting Involved” or “Ordering & Use”. Others still use the “what, when, where, why, and how” approach, with categories like, “Who We Are” and “What We Do”, or “How to Join”. Finally, another common approach is to use the question mark or interrogative voice, such as “Ready to Participate?”

Page Layout and Responsive Design

Page layout varied significantly, not only among the sites analyzed but also within the sites. Nearly half (12) of the sites analyzed had a homepage with significantly different layout than other pages. Often, this took the form of a large search box near the top, multiple columns of jumping off point links, sliding galleries showcasing the latest content or projects, and/ or links to news or blog posts. The number of columns per page generally varied from 1-3 throughout each site, with 1-2 columns being the most common. Generally speaking, search catalogs feature main content on the right whereas a smaller column containing search-refining widgets, faceting tools, recommended searchers, social media links, and other items is on the left.



Images 5-7: Three digital collection catalogs, the DPLA, top left, the Portal to Texas History top right, and the North Carolina Digital Heritage Center, bottom

Other pages vary in their layout; approximately 50% of the time, main content is on the left whereas navigation and other widgets are in a smaller column on the right. The other half of site pages are laid out in the reverse order, with main content on right with navigation and other items in smaller column on the left.

19 of 25 service hub sites are entirely mobile friendly indicating that this is standard among sites as well as an expectation among users. Other sites appear to conform to older standards of usability, with fixed-width layouts designed to fit screen sizes on a range of devices without responsive resizing of elements. Several other sites are partially responsive to different devices.

Aesthetics: Logos and Color Schemes

22 of the 25 service hub sites surveyed featured some kind of logo in addition to a site title. Along with the the IDHH, only Missouri, Oklahoma, and Tennessee which are all in early phases of development, lack a logo at the time of the writing of this paper. An analysis of some of the logos may provide some inspiration for developing the IDHH's own.

Most logos include the hub title fully spelled out or an acronym, such as "Digital Commonwealth" of Massachusetts or "BSCDN", the Big Sky Country Digital Network of Montana. Nine of the 22 hubs representing particular states featured an outline of the state as a part of the logo design.

Other hubs employ a state or regional symbol, plant, or animal, such as the American antelope or pronghorn on the logo of the Plains and Peaks Collective, Colorado and Wyoming's service hub, or the palmetto, the state plant, on the South Carolina Digital Library.

One, Recollection Wisconsin, includes a collage of images pertinent to state history from items in their collections.

Others use original, symbolic art that may or may not contain the outline of the state, such as Calisphere (the California Digital Library's portal), PA Digital, the Ohio Digital Network, the Sunshine State Digital Network of Florida. Finally, others use only stylized titles, such as Digital Maine, District Digital of Washington, D.C., The Kentucky Digital Library, the Minnesota Digital Library, the Mountain West Digital Library of Utah, Nevada, and Idaho, the Portal to Texas History, the USC Digital Library, and Washington University Libraries.

22 out of 25 service hub websites have color schemes for background elements, text, and other components. Others are largely black and white outside of the logo. Many site's color schemes are related to their logos. Color schemes are also often similar to certain universities' colors that have large stakes in the project. For example, the deep blue of the Michigan Service Hub is similar to the background of the University of Michigan seal. The case is similar for the North Carolina Digital Heritage Hub's medium blue colors and the school colors of the University of North Carolina Chapel Hill.

Hub Site Maintenance and Upkeep

The sites with the earliest creation dates that could be determined are the Digital Library of Georgia (2002), the Minnesota Digital Library (2003), and the Portal to Texas History, (2005), and Digital Commonwealth (2006). All of these sites have gone through major redesigns throughout their lifetimes. The Digital Library of Georgia has been redesigned at least twice, once in 2005[7] and in 2018[8]. The Internet Archive features snapshots from at least four designs for the Minnesota Digital Library from its founding in 2003[9], a redesign seen in this 2006 snapshot[10], another seen in a 2009 snapshot, to the current site's look and feel (since at least 2015)[11]. The Portal to Texas History has undergone at least three major revisions, based on the original specs of the site described in a 2005 paper by hub founders[12], Internet Archive screenshots from 2007[13] and 2015[14] and the current version of the site (as of 2016)[15]. Digital Commonwealth seen three redesigns since its debut[16], as seen in this snapshot from 2008[17], another from 2013[18], and the look at least since 2015[19].

[7] https://about.galileo.usg.edu/timeline/
[8] https://web.archive.org/web/*/https://dlg.usg.edu/
[9] https://web.archive.org/web/20040830163658/https://mndigital.org/
[10] https://web.archive.org/web/20060103160716/https://mndigital.org/
[11] https://web.archive.org/web/20150805194753/https://mndigital.org/
[12] Gelaw Alemneh, D., et al. (2005). Development of a portal to Texas history. Library Hi Tech, 23(2), 151–163. https://doi.org/10.1108/07378830510605124
[13] https://web.archive.org/web/20070915092626/http://texashistory.unt.edu/
[14] https://web.archive.org/web/20150324224124/https://texashistory.unt.edu/
[15] https://web.archive.org/web/20190517232343/https://texashistory.unt.edu/
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[17] https://web.archive.org/web/20080722185722/https://www.digitalcommonwealth.org/
[18] https://web.archive.org/web/20130902091223/https://www.digitalcommonwealth.org/
[19] https://web.archive.org/web/20150618235401/https://www.digitalcommonwealth.org/

Other newer sites have seen major updates. Indiana Memory appears to have undergone at least one major redesign since its establishment in 2008 based on the mobile friendly features of the current site and the description provided in a 2008 paper by project director, Connie Rendfeld[20] as well as Internet Archive snapshots[21] of an earlier version. Calisphere, the portal for the California Digital Library, has undergone at least one major redesign since its initial release in 2008, based on its appearance from snapshots from 2008-2015[22] and a new design rolling out around 2016[23]. Based on these examples, redesigns for these six service hub sites have occurred from about ever 4.5 years to about once per decade, averaging out to one redesign every 7.5 years. Thus, redesign will be a necessary part of the future of a service hub website, lest the site lose pace with current design trends and usability standards.

Updates short of redesigns are difficult to track in service hub sites outside of time stamped content, such as blog posts. 13 sites have blogs or news pages with dates. 14 sites have been updated fairly recently, at least since December 2018. Blog posts, along with new collections, are likely the most frequent kinds of updates but others include new featured items, collections, and providers, as well as links to new projects. Some other routine maintenance that might be necessary are link checking, and updates to linked content, such as project documentation. Among sites with timestamped content, update frequencies range from often, every week or so, to rarely, less often than every six months. Among the sites that are regularly updated, new content is posted about every six weeks on average.

Conclusions and Recommendations for IDHH Web Development

The above analysis allows for a picture of a typical service hub site and for generalizations about typical site audiences, features and content, layout, and aesthetics.

Audience

Most service hub sites appeal to only one primary audience: contributors. The IDHH website should, at a minimum, provide and organize materials for contributors. However, in order to accomplish its main goal for outreach and marketing beyond contributing institutions, the IDHH website should also appeal to at least some of the other common audience types, such as: K-12 educators and students, hobbyists, graduate and postgraduate scholars. Materials for different audiences can be compartmentalized in the structure of the website and should be prioritized to rollout before or after the initial release date of 2019-07-01.

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[20] Rendfeld, C. (2008). Indiana Memory: A New Tool for Accessibility. Indiana Libraries, 27(3), 44–46.
[21] https://web.archive.org/web/20091117021752/http://www.in.gov/memories/
[22] https://web.archive.org/web/20150905052321/http://www.calisphere.universityofcalifornia.edu/
[23] https://web.archive.org/web/20160916080227/https://calisphere.org/

Content and Features

Examination of service hub website provided a baseline of common content and features of the average site. At least half of service hub sites provided one or more of the following:

1. About page
2. Provider list
3. Orientation materials for contributors
4. Social media links
5. Search feature
6. Information on hub governance
7. Archive of Documentation for contributors

With the exception of social media links, each of these are important features to prioritize for a first iteration and release of the IDHH website. An additional recommendation is a contact page. Although contact pages or forms are not among the most common features of service hub sites, a primary contact email for the hub visible throughout the site (such as in the footer) is a nearly universal feature and a contact page would allow interested parties to easily find the email and/or phone number of the IDHH staff who may best address their needs.

Additional features to consider in updates subsequent to the 2019-07-01 initial release are perhaps the next most common features, including:

1. News
2. Metadata resources for contributors
3. Explore by values (other than by contributor)
4. Featured items

Long term development and maintenance may involve some of the rarer features that add value to a strong initial round or two of development. These may include curated exhibits and primary source sets, as well as more featured content, such as featured collections. This content again, requires staffing, both to develop as well as to maintain long term, possibly beyond the duration of the current grant.

The particulars of certain features and their importance to the IDHH web development project warrant additional attention.

Materials for Contributors

Most hubs provide orientation for contributors. Some hubs provide this content within the main service hub site and others link out to a different site exclusively for contributors.

For the IDHH website, it is recommended to provide most of the common features of a documentation archive for contributors, such as metadata and intellectual property rights

standards, best practices, and guidance. These have already been developed by IDHH and are live through several pre-existing websites. This material can either be migrated to a new site or, more simply, linked to within a new site's navigation.

Provider Lists

Most sites have provider lists. Among the sites that feature provider lists, these typically link to the complete record set the provider has contributed to the DPLA or the hub. It is recommended to include a complete list of providers that link to record sets on an initial release of the IDHH website. This feature is important for crediting provider's contributions and empowering professional and non-professional users alike to explore and utilize providers' record sets.

Additional features related to a provider list that can be implemented later include a map of the state including all contributors and possibly thumbnails for each provider.

Search and Discovery

Only about half of service hubs provide search and discovery. However, it is almost universal across sites geared for an audience wider than only contributors. It is therefore, a recommended feature of a first round of web design if the IDHH wishes to appeal to a broad audience as an essential service to this audience. Search and discovery will likely be the biggest challenge for web development as most hubs with search and discovery features rely on extensive infrastructure that has been developed and maintained for years alongside multiple iterations of websites. It can therefore be fairly safe to assume that search and discovery solutions will be intensive consumers of resources, especially if they are developed in-house. Moreover, the IDHH does not have the advantage of a single content management system solution with its own built in search and discovery and, instead, is distributed across nine entities and different systems across the state.

When search and discovery infrastructure is present, it is common for search boxes to be provided prominently on a homepage and to appear less prominently but universally throughout the rest of the pages of a site, usually in the top right or top center.

Explore by or Browse by Options

Explore by or browse by options are common among service hub sites and therefore, may add value to a site that has already met the minimum recommendations outlined above. In addition to browsing by contributors, subject terms are the most common options among service hub sites, followed by type, format, and geographic metadata, such as state, city, and/ or county. With search and discovery service already in place, it will be simple to set up browse by options as jumping off points from a technical standpoint but much time and thought will need to be put into developing viable options relevant to various site user bases.

Presentation and Site Structure

This section discusses the typical strategy deployed by a service hub site in structuring and presenting the content and features outlined above.

Navigation

There are several strategies for helping different users navigate a service hub website, especially in terms of word choice for navigation categories; addresses to a particular audience, often in active voice, appeared to be the most common options. Usability research reveals labels should be kept terse[24] and average 1-2 words maximum across hub sites. However, card sort exercises before the site and navigation go live and follow-up usability research will be needed to determine optimal wording of navigation categories

In order to avoid overwhelming users with navigation options, it is recommended to keep main navigation options limited and within the average number of options across service hub sites: 3-6. Horizontal navigation is far more common than vertical or a combination of the two.

Page Layout

A typical service hub homepage has two highly recommended features: a prominent search box larger and more visible than on the other pages of the website at or near the top of the page as well as text briefly describing the hub and site's purpose. Other content may include jumping off point links, such as the "explore by"/ "browse by" categories described above.

Usually, main page content is on one side and navigation or other link options appearing in a smaller column on the side of the page opposite of the main content. 1-2 columns is most common. Pages with more than 4 columns are rare.

19 out of 25 service hub websites are responsive, indicating that responsive design is not an option but an expectation among hub site users.

Aesthetics

Branding is nearly universal across websites. It is recommended that the IDHH develop distinctive organization and site colors, along with a logo. Some inspiration for logos may be gleaned from other sites, such as state animals, plants, geography (such as a state map outline), regional symbol, or a stylized hub title or acronym.

[24] Johnson, J. (2014). Chapter 6 - Reading is Unnatural. In J. Johnson (Ed.), Designing with the Mind in Mind (Second Edition) (pp. 67–85). Boston: Morgan Kaufmann. https://doi.org/10.1016/B978-0-12-407914-4.00006-3

Maintenance and Website Upkeep

Documents on other hubs and conversations with multiple staff revealed that not only maintenance but redesign of the website is inevitable if the site is to remain technologically up-to-date and to conform to a typical user's usability expectations. Most sites remain in touch with current standards, such as responsive design.

In addition to the inevitability of re-design, maintenance will be necessary. Maintenance may include short-term one-off changes, such as a series of major updates over the first six to twelve months following the initial launch. Maintenance will also involve regular updates to features and content, such as updating a blog and possibly news, linking to new or updated documentation, checking and repairing links, potentially changing featured images/ collections, updating contact information in response to staffing changes. It is important to note that how vigorously a site is maintained and regularly updated early in its lifetime may establish expectations among user base. Therefore, a solid initial design and consistent updates following is recommended. In addition, long term sustainability, e.g., beyond the scope of the grant, should be considered.

Next Steps

Selecting a development platform or framework that suits the IDHH's web development needs is the immediate next step. Other service hubs' websites reveal a range of platforms with various capabilities and various resource requirements for development and maintenance.

Some solutions deployed by other service hubs are simply not feasible, such as those that require extensive in-house development using full stack development options, like the choices of the Portal to Texas History or the Digital Library Georgia. This is due to the limited time for developing a solid framework for launching a prototype as well as the limited resources dedicated to web development at this time, with respect to other hubs that have multiple full-time staff dedicated to project development. In-house development solutions would also require significant software and hardware commitments for storing and serving data. Extensive programming will be needed along with intensive web development to provide a catalog. Search solutions would need to be selected or built in order for users to efficiently interact with the catalog. Multiple rounds of user testing would be required just for the catalog development. While this approach has resulted in the robust web presences of several established hubs with several staff dedicated to programming and web development, it is not recommended for the IDHH to attempt intensive in-house development.

One popular choice among hubs is a WordPress site. Recollection Wisconsin and PA Digital are two examples of hubs with extensive content provided on WordPress sites. The advantage of WordPress is that it is widely-known, easy to learn, and well-supported. The shortfalls for the IDHH project is that search and discovery service will have to be developed separately and a

hosting solution both for search and discovery and the WordPress installation will have to be resolved. Therefore, a solution involving WordPress is not recommended.

Local, DPLA's web development framework is recommended. The framework is a cutting edge application based on the architecture that undergirds the main DPLA website and the basic template and user interfaces for search and discovery are well-built and thoroughly tested. Current usability expectations, such as sophisticated responsive design, are already more than adequately addressed by Local. Hosting will be handled by the DPLA and thus, will not require the hub to dedicate server space and request access permissions for various IDHH staff now and in the future. Hub-side development will mainly constitute creating content for individual pages in markdown files and sharing these with DPLA developers through GitHub, cloud storage, or email. This cuts down significantly on development time, which will focus more on gathering the content and designing and building individual features of the website rather than selecting and deploying an entire fullstack development framework and putting together architecture from the ground up, in addition to creating and gathering content. Moreover, long term maintenance of the website will not require the expertise of a seasoned web developer.

Some shortfalls of DPLA Local are sustainability and the fact that content will be static, at least for initial rounds of development. Funding for the DPLA project is not guaranteed. Therefore, questions regarding the sustainability of Local naturally arise. However, DPLA's web architecture is completely open and can be downloaded from GitHub and deployed locally if the need should arise. Moreover, empowering hubs to curate dynamic content that can be integrated on a Local site, content such as exhibits, is one of the DPLA's priorities for pursuing funding over the remainder of the year. Based on preliminary talks with DPLA staff, embedding dynamic content hosted elsewhere should also be feasible. In short, Local seems to be the most viable solution for developing a working prototype by the 2019-07-01 deadline and, more importantly, maintaining a well-built, usable website for the IDHH for the foreseeable future.

Appendix I: All Service Hub Content Types

Content Type	Number of Hubs
Orientation materials for contributors	20
About page describing hub project and/ or site in detail	20
Provider list and/ or map	19
Information on Hub Governance	18
Social media links	17
Project Documentation for contributors	16
Search feature	14
News	13
Metadata resources for contributors	13
Contact form or page	12
Explore by values (other than contributor)	12
Featured items	10
Blog-like entries	10
Featured collections	8
Digitization Resources for contributors	8
Rights resources for contributors	7
Outreach and promotional material	6
Tutorial or instructions on using site and/ or or site features	5
FAQs	5
Staff listing	4
Featured providers	3
Social media embeds	3
Exhibits	3
Terms of use	3
Primary source sets	2
Web design contacts through website	2
Accessibility policy	2
Events page and/ or calendar	2
Sustainability plans or other efforts	1

Appendix II: All Service Hub Site Navigation Categories

Navigation Category	Number of Hubs with Navigation Options in Category
About	21
Home	18
For Contributors	16
Connect	12
Explore	12
Search	8
For Educators	3
Documents	2
Help	2
Links	2
News	2
Policies	2
Account	1
Events	1
Mobile	1
Outreach and Promotion	1
Reproductions	1